

REMARKS

This Response is in response to the Official Action mailed May 20, 2002. The Office Action was in response to the Applicant's Response After Final Rejection. However, the present Office Action has stated that it is a non-final rejection. Thus, although not stated by the present Office Action, it is assumed that the Applicants arguments were found persuasive and that the December 13, 2001 Final Rejection has been withdrawn. This is the second time over the last two years that the Office has withdrawn the finality of a Final Office Action.

Claims 1, 2, 4-7, 12-16 and 28-33 remain in the application.

A Petition for Extension of Time to extend the period for response one month, including the appropriate fee, is filed herewith.

A. COMMENT

The Office has again presented the Applicants with an improper Office Action. The Office Action contends at page 2 that the claims are rejected over the Buschbom patent, the Hembree et al. patent, the admitted prior art, the Scholz patent, and the Hembree patent. However, in the body of the rejection, the Office Action at page 6 references that it has rejected claims 13, 14, and 16 over the Domadia et al. patent. Thus, with such conflicting information, it is not clear to the Applicants whether the Domadia et al. patent is supposed to be applied to the claims.

Again, as set forth in Section 706 of the MPEP: "... The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest

opportunity.” Furthermore, MPEP 706.02j states that “[i]t is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply.”

B. 35 U.S.C. § 103(a)

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 1, 2, 4-7, 12-16, and 29-31 – the Buschbom patent in view of the Hembree et al. patent, APA, Scholz patent, and the Hembree patent

Claims 1, 2, 4-7, and 29-31 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,834,335 issued November 10, 1998 to Milton Buschbom (hereinafter “the Buschbom patent”) in view of U.S. Patent No. 5,931,685 issued August 3, 1999 to Hembree, Jacobson, Wark, Farnworth, Akram and Wood (hereinafter “the Hembree et al. patent”), the admitted prior art (hereinafter “APA”), U.S. Patent No. 5,329,423 issued July 12, 1994 to Kenneth Scholz (hereinafter “the Scholz patent”), and U.S. Patent No. 5,783,461 issued July 21, 1998 to David Hembree (hereinafter “the Hembree patent”) (Office Action, pages 2-9).

Claims 1, 2, 4, and 12

It appears from the Office Action at pages 2-3 that claims 1, 2, 4, and 12 have been rejected over the Buschbom patent only. The Office Action references claims 1, 2, 4, and 12 at page 2 then gives its interpretation of the Buschbom patent. However, the Office's interpretation of the Buschbom patent is in error. The Office Action at page 3 states that the Buschbom patent teaches "solder balls (28 in Fig. 3) extending between the substrate and PCB contacts where the solder balls are attached to the respective contacts/pads (bumps 60B-Fig. 5A; Fig. 4-6. Col. 3, line 28)."

Unfortunately, it respectfully does not appear to the Applicant that the Office Action makes sense. First, there is no element "bumps 60B" in the Buschbom patent. Second, there is no Fig. 5A in the Buschbom patent. Third, there is no Figs. 5 or 6 in the Buschbom patent with regard to the Office Action referencing "Fig. 4-6".

Again, as quoted by the Applicants with regard to incomplete or confusing rejections in previous Office Actions, Section 706 of the MPEP sets forth that: "... The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest opportunity." Furthermore, MPEP 706.02j states that "[i]t is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply."

The confusing inclusion of the elements which do not exist in the the Buschbom patent has resulted in the Office not communicating a clear basis for a rejection, and has denied the Applicants an opportunity to reply to any issues that the Office might have had if the claims had

been properly examined. Thus, as claims 1, 2, 4, and 12 have not been properly examined by the Office, no Final Action can be issued with regard to these claims.

Nonetheless, even the characterization of the Buschbom patent by the Office Action is respectfully believed to be in error. The Office Action states that the Buschbom patent teaches “solder balls (28 in Fig. 3) extending between the substrate and PCB contacts where the solder balls are attached to the respective contacts/pads”. However, the solder balls 28 do not extend between the substrate (i.e., package 27) and the PCB (i.e., circuit board 12). The solder balls 28 extend between the package 27 and a contacts 24 extending through an interposer 14. The contacts 24 are, in turn, contact pads 20 on the circuit board 12. In fact, the Buschbom patent teaches away from the claims of the present application. The present application seeks to achieve a non-reflow contact between a solder ball and a contact either on the substrate or the motherboard. The Buschbom patent teaches to place a non-metal conductive material (the contacts 24) between the solder ball and the contact pads 20 of the circuit board 12.

The Office is respectfully reminded that “[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984) (see M.P.E.P. 2141.02).

After the Office Action presents its interpretation of the Buschbom patent it states that “Buschbon fails to specify the PCB substrate being a motherboard.” The Office Action then relies on the Applicants’ background information for teaching a microelectronic die attached to a motherboard. The only motivation that the Office provides for such a combination was “to incorporate motherboard to achieve the desired connection density in Buschbom’s assembly.”

The Applicants have no idea what “the desired connection density” has to do with the present invention, much less why that would motivate one skilled in the art to form the apparatus of the present invention. Although the Office has not shown that all the elements of the claims (as discussed above), the Office is respectfully reminded that even if all the elements of claims were taught or suggested by the references, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teachings, suggestion, or motivation to do so found in the references, *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347 (Fed. Cir. 1992). A showing of a suggestion, teaching, or motivation to combine prior teachings “must be clear and particular.” *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). A comment of motivation that does not even relate to the present application could certainly not be alleged to be “clear and particular”. Thus, the Office Action has failed to “present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references”, as set forth in M.P.E.P. 706.02(j).

Therefore, as the Buschbom patent teaches away from the present invention, it certainly could not be asserted that the Buschbom patent teaches or suggests the present invention, much less that there is a suggestion or motivation to modify the patent. Furthermore, as there has been no relevant motivation given by the Office with regard to the Buschbom patent utilizing a motherboard, a prima facie case for obviousness has not been established.

Thus, for the reasons stated above, reconsideration and withdrawal of the Section 103(a) rejection of claims 1, 2, 4, and 12 are respectfully requested.

Claims 5-7 and 29-31

It appears from the Office Action at pages 4-5 that claims 5-7 and 29-31 have been rejected over the Buschbom patent in view of the Hembree et al. patent. The Office Action states:

Regarding claims 5-7 and 29-31, **Buschbom discloses the motherboard/PCB contacts being conventional pads/contacts (24 in Fig. 3; Col. 3, line 5) but fails to specify:**

- a) the contacts comprising a recess defined by at least one sidewall extending into the substrate and the recess width and shape of same radius as that of the solder ball respectively, and
- b) attaching the solder balls to the motherboard and forming the recess as claimed above in a) in the substrate (emphasis added)

This assertion is confused, at best. The Office Action at page 3 admits that “Buschbom fails to specify the PCB substrate being a motherboard”, then now reverses its contention by stating at page 4 that “Buschbom discloses the motherboard”. Applicants are not sure how to respond to the inconsistent interpretation of the references. Nonetheless, the Applicants will respond to the Office Action to the extent that it can be understood.

As has already been pointed out by the Applicants, the Hembree et al. patent relates to an “Interconnect For Making Temporary Electrical Connections With Bumped Semiconductor Components” (as that is its title). In other words, the Hembree et al patent relates to temporary packaging for testing semiconductor dice. As previously pointed out by the Applicants, the presently claimed invention is directed to removably attaching a substrate to a motherboard for the fabrication a microelectronic device rather than for temporary/testing purposes. The Hembree et al. patent neither teaches nor suggests a non-reflow electrical contact with a solder ball between a substrate and a motherboard.

Furthermore, the deficiency of the Buschbom patent still exists for the rejection of claims 5-7 and 29-31. Again, the Office Action states that the Buschbom patent teaches "solder balls (28 in Fig. 3) extending between the substrate and PCB contacts where the solder balls are attached to the respective contacts/pads". However, the solder balls 28 do not extend between the substrate (i.e., package 27) and the PCB (i.e., circuit board 12). The solder balls 28 extend between the package 27 and a contacts 24 extending through an interposer 14. The contacts 24 are, in turn, contact pads 20 on the circuit board 12. In fact, the Buschbom patent teaches away from the claims of the present application. The present application seeks to achieve a non-reflow contact between a solder ball and a contact either on the substrate or the motherboard. The Buschbom patent teaches to place a non-metal conductive material (the contacts 24) between the solder ball and the contact pads 20 of the circuit board 12.

Thus, the Office Action has relied on two references that teach away from the present invention. Furthermore, with regard to claims 7 and 31, Office Action has shown no teaching or suggestion in either the Buschbom patent and the Hembree et al. patent of a recessed motherboard contact having a semispherical surface which is substantially the same radius as a radius of said solder ball. It is noted that the Office Action at page 4 refers to the Hembree et al. patent teaching selecting size, shape (circular, oval, square, etc.), dimensions, etc. However, this is not a teaching of matching the radius of the solder ball with a semispherical contact.

Moreover, the Scholz patent is relied on at page 5 for a teaching of "forming the bumps/balls and recesses (24/28 in Fig. 1) interchangeably on IC substrate and PCB substrate respectively (10/12 in Fig. 1) or those (58/62 in Fig. 3) on PCB substrate and IC substrate respectively (52/46 in Fig. 3)". However, the Scholz patent does not overcome the deficiencies

of the Buschbom patent and the Hembree et al. patent.

Yet further, the only motivation that the Office provides at page 5 for the combination of these three patents is “to improve the surface connection, reliability, and bonding strength”. This motivation is unclear. “Bonding strength” is not a concern in the present invention, as the invention related to a non-reflow contact.

Therefore, as the Buschbom patent and the Hembree et al. patent teach away from the present invention, it certainly could not be asserted that they teach or suggest the present invention, much less that there is a suggestion or motivation to modify these patents. Furthermore, as there has been no relevant motivation given by the Office with regard to the combination of the Buschbom patent, the Hembree et al. patent, and the Scholz patent. Thus, the Office has failed to “present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references”, as set forth in M.P.E.P. 706.02(j).

Thus, for the reasons stated above, reconsideration and withdrawal of the Section 103(a) rejection of claims 5-7 and 29-31 are respectfully requested.

Claim 15

It appears from the Office Action at page 5 that claim 15 have been rejected over the Buschbom patent only. The Office Action states “[r]egarding claim 15, Buschbom further discloses an interposer substrate (14 in Fig. 1) having a first and second surfaces and the surfaces including conventional contacts/terminals (24 in Fig. 1) to achieve the connection between the IC chip substrate and the PCB substrate (Col. 2, lin 53- Col. 4, line 18).”

Dependent claim 15 of the present invention in combination with its independent claim 12 requires a solder ball between the interposer and the motherboard. First, as admitted by the Office Action at page 3 admits that the Buschbom patent does not teach a motherboard. Second, the Buschbom patent does not have solder balls between the interposer and the motherboard. In fact, the contacts 24 of the interposer 14 of the Buschbom patent directly contact the pads 20 on the circuit board 12.

Thus, as the Buschbom patent neither teaches nor suggests all of the limitations of claim 15, a prima facie case of obviousness has not been made. Therefore, reconsideration and withdrawal of the Section 103(a) rejection of claim 15 are respectfully requested.

Claims 13, 14, and 16

It appears from the Office Action at pages 5-6 that claims 13, 14, and 16 have been rejected over the Buschbom patent in combination of with the APA and Hembree. However, the Office Action also includes the Domadia et al. patent without having referenced it as a basis for the rejection of the claims. In order to advance the prosecution of the present application, the Applicants will address the Domadia et al. patent as though the Office had properly referenced it.

Claims 13, 14, and 16 depend either directly or indirectly from claim 12, thus all of the arguments with regard to claim 12 are hereby incorporated herein by reference. Again, the characterization of the Buschbom patent by the Office Action is believed to be incorrect. The Office Action states that the Buschbom patent teaches "solder balls (28 in Fig. 3) extending between the substrate and PCB contacts where the solder balls are attached to the respective contacts/pads". However, the solder balls 28 do not extend between the substrate (i.e., package

27) and the PCB (i.e., circuit board 12). The solder balls 28 extend between the package 27 and a contacts 24 extending through an interposer 14. The contacts 24 are, in turn, contact pads 20 on the circuit board 12. In fact, the Buschbom patent teaches away from the claims of the present application. The present application seeks to achieve a non-reflow contact between a solder ball and a contact either on the substrate or the motherboard. The Buschbom patent teaches to place a non-metal conductive material (the contacts 24) between the solder ball and the contact pads 20 of the circuit board 12.

The APA and the Domadia patent are used by the Office for a teaching of a compression mechanism/support. However, the APA and the Domadia patent do not overcome the deficiencies of the Buschbom patent, as the APA relates to reflow connection between the motherboard and the substrate, and the Domadia patent merely relates to a stiffener and a heat spreader.

Furthermore, the Hembree is only used for a teaching of a resilient spacer. Likewise, it does not overcome the deficiencies of the Buschbom patent.

Thus, as none of the references, teach or suggest all of the limitations of the present claims, reconsideration and withdrawal of the Section 103(a) rejection of claims 13, 14, and 16 are respectfully requested.

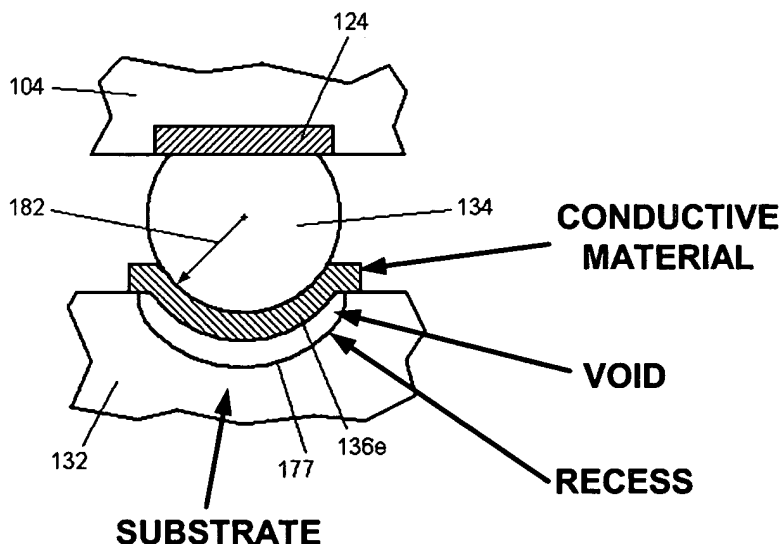
Claims 28, 32, and 33

Claims 28, 32, and 33 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Hembree et al. patent in view of the Scholz patent (Office Action, page 7).

With regard to claim 28, the Office Action at page 7 correctly states that the Hembree et al. patent does not “label or show a numerical reference for a void in Figures.” The Office Action then states on page 8 that “Scholz teaches forming the bumps and recesses in the substrate (58 and 46 in Fig. 4) where conductive material (58/66 in Fig. 4) layered over the recess forms a void between the layers of solder and the recess.” However, Fig. 4 of the Scholz simply shows a recess between the solder and the contact. There is no void formed between the conductive material and the recess, as claimed in claim 28. The Applicants have repeatedly directed the Office to the language of the limitations in claim 28 and to FIG. 2e. However, Applicants again respectfully contend that the Office has not carefully considered the language of the claims. Therefore, the Applicants have again inserted the claim 28 and figure 2e (one possible embodiment of claim 28), wherein the limitations of claim 28 are referenced on FIG. 2e.

28. A substrate contact for forming a non-reflow electrical contact with a solder ball, comprising:
a recess defined in a substrate by at least one surface extending into said substrate; and
a conductive material layered over said recess forming a void therebetween.

FIG. 2e



Therefore, it should be clear that neither the Hembree et al. patent nor the Scholz patent either teach or suggest the claim limitation of a void formed between the conductive material and the recess. Thus, the rejection presented in the Office Action is without merit and claim 28 is allowable over the cited art.

With regard to claims 32 and 33, the Office Action correct states that the Hembree et al. patent does not teach or suggest a contact with a semispherical surface which is substantially the same radius as a radius of the solder. However, to overcome this lack of teaching or suggestion, the Office Action merely states that the arrangement claimed would be a matter of design. However, this statement is insufficient. As set forth in MPEP "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Therefore, this rejection is without merit.

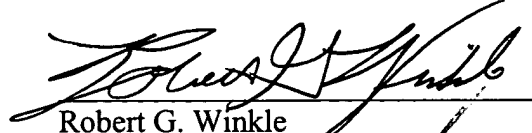
Thus, reconsideration and withdrawal of the Section 103(a) rejection of independent claims 28, 32, and 33 are respectfully requested.

The current Section 103(a) rejections are without merit. Therefore, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1, 2, 4-7, 12-16 and 28-33.

In view of the foregoing remarks, the Applicants request favorable reconsideration and allowance of the application.

Please forward further communications to the address of record. If the Examiner needs to contact the below-signed attorney to further the prosecution of the application, the contact number is (503) 712-1682.

Respectfully submitted,



Robert G. Winkle
Attorney for Applicants
Reg. No. 37,474

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